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ABSTRACT

The Computer Education Program, funded by the Municipal Assistance Corporation/Vocational Improvement Program (MAC/VIP), assists New York City high schools in promoting computer education and integrating the use of computers in subject area instruction. Project goals include providing assistance in the evaluation, purchase, and installation of computer hardware, review and selection of instructional software, development and dissemination of related curriculum materials, and staff development support. This evaluation of the MAC/VIP Program during the 1985-86 school year was based on questionnaire responses from a sample of school administrators, computer coordinators, and teachers using the labs. Findings included the following: (1) most of the computers were installed and in use by October 1985; (2) administrators were generally satisfied with their hardware choices; (3) responsibilities of computer coordinators were wide-ranging and exceeded the officially allocated time; (4) computer labs were used for a majority of class periods during the school year; (5) a majority of teachers reported receiving some in-school assistance; and (6) large proportions of respondents believed in the value of computers in education. A list of recommendations is included. (PS)

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MUNICIPAL ASSISTANCE CORPORATION/
VOCATIONAL IMPROVEMENT PROGRAM
COMPUTER EDUCATION PROGRAM
EVALUATION REPORT
1985-86
END OF YEAR REPORT

OEA Evaluation Report

UD 025 462

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January, 1987

MUNICIPAL ASSISTANCE CORPORATION/ VOCATIONAL IMPROVEMENT PROGRAM COMPUTER EDUCATION PROGRAM EVALUATION REPORT 1985-86 END OF YEAR REPORT

Prepared by the O.E.A.
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SUMMARY

The Computer Education Program funded by the Municipal Assistance Corporation/Vocational Improvement Program (MAC/VIP) is administered by the Office of Technology. Its broad aims are to assist New York City high schools in promoting computer education and integrating the use of computers in subject area instruction. Project goals include providing assistance in the evaluation, purchase, and installation of computer hardware, review and selection of instructional software, development and dissemination of related curriculum materials, and staff development support.

During 1984-85, more than 300 computer laboratories were installed in 93 public high schools (Phase I schools). About two-thirds of these labs were equipped with 17 microcomputers (two students per machine) and were intended for general education purposes (MAC labs); the other labs have 33 work stations (one student per machine) and were to be used primarily for teaching word processing and other business-oriented applications (VIP labs). These computer labs were operational for the first time during the 1985-86 school year.

In addition to the curriculum and staff development support available to all public school personnel through the Office of Technology (e.g., computer education curriculum guides, conferences, and in-service courses), the program offered training for one teacher and one supervisor of each of six to eight different subject areas in each of the Phase I high schools. They, in turn, were expected to provide assistance to their peers in using computers for instruction.

The evaluation of the MAC/VIP Program during the 1985-86 school year focused on: equipping and staffing the computer labs; the nature and extent of lab use; staff development; school staff perceptions of the role of computers in education; and future needs and plans of the Phase 1 schools.

Major findings, based on questionnaire responses from a sample of school administrators, computer coordinators, and teachers using the MAC/VIP labs, included the following:

-- Most of the computers were installed and in use by October 1985, a notable achievement, given the magnitude of the task.

-- Generally, administrators were satisfied with their hardware choices, although some found that the equipment they selected had such functional drawbacks as slow speed of operation, and limited memory and printing capabilities.

-- Responsibilities of computer coordinators were wide-ranging, and included scheduling lab use, training school staff, reviewing and selecting software, and troubleshooting hardware and software problems. Coordinators reported spending about 15 hours -- twice as much as was officially allocated -- in carrying out these duties. They expressed a need for more time to review and select software and a need for aides to assist them in managing the laboratories.

-- Computer labs were used for a majority of class periods during the 1985-1986 school year. However, during this first year of program operation, the labs were used more for teaching computer applications such as word processing and programming than for subject area instruction. This was attributed both to difficulty in identifying quality software appropriate to specific curriculum objectives, and teachers' lack of confidence in integrating computers into regular classroom instruction.

-- A majority of teachers reported receiving some in-school assistance, primarily from computer coordinators; they also participated in various other computer-related training activities outside their schools. Nevertheless, many expressed the need for continued support, particularly in using computers to teach academic subjects.

-- Large proportions of all respondent groups of school staff, including some prior skeptics, expressed belief in the value of computers in education; many attributed positive changes in students' attendance and attitudes toward their schoolwork to their computer-based experiences. Teachers also noted that their own role in the learning process tended to be more that of a facilitator than a lecturer in the labs, a shift which they believed promoted more individualized instruction.

Based on these evaluation findings, the following recommendations are made:

- Continued assistance should be provided to school staff in evaluating educational software, and obtaining site licensing or multiple copy agreements.

- Efforts to develop computer-related instructional materials (software and teacher guides) specifically correlated with current curriculum mandates should be continued.

- Ongoing and expanded assistance and encouragement should be provided to all school personnel, and particularly to supervisors and teachers in integrating computer use in subject area instruction; to the extent possible, such training opportunities should be available on-site and be responsive to individual school needs.

- New funding should be made available to schools to: 1) upgrade computer equipment and secure better and more cost-effective means of dealing with maintenance and repairs; and 2) provide additional resources for both managing the computer labs and making them more accessible to students and staff.

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I. INTRODUCTION

PROGRAM OVERVIEW

Recognizing the need to prepare students to meet the demands of an increasingly technological society, as well as the potential of computers to facilitate learning, the New York City Board of Education has instituted a plan to promote computer education and the integration of computers in subject area instruction in all New York City public schools. Known as the New York City Comprehensive Action Plan for Technology, it provides for the evaluation, purchase, and installation of computer hardware, review and selection of instructional software, development and dissemination of related curriculum materials, and staff development for school and district personnel. One plan component, the Computer Education Program funded under the Municipal Assistance Corporation/Vocational Improvement Program (MAC/VIP) and directed by the Office of Technology, is concerned with the implementation of the Comprehensive Plan at the high school level.

During 1984-85, more than 300 computer laboratories were installed in 93 public high schools. These are referred to as Phase I schools.* About two-thirds of these labs were equipped with 17 microcomputers (two students per machine) and were intended for general education purposes (MAC labs); the remaining labs have 33 work stations (one student per machine) and were to be used primarily for teaching word processing and other business-oriented applications (VIP labs).

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*An additional 150 high school computer laboratories were to be installed during the 1985-86 school year and ready for use by September, 1986 (Phase II schools).

A wide range of curriculum and staff development activities have been developed by the Office of Technology to assist public school staff in using computers to promote a variety of educational goals. These include the publication of computer education curriculum guides and conferences and in-service courses on such topics as using computers for instruction, evaluating and selecting subject-specific software, and basic computer maintenance and repair. While these activities were not designed exclusively for MAC/VIP Program participants, many were appropriate to their needs. In addition, the program did provide training for one teacher and one supervisor from each of six to eight different subject area departments in each participating high school. They, in turn, were expected to assist their peers in using computers for instruction.

SCOPE OF THE EVALUATION

The evaluation of the implementation of the MAC/VIP Program during the 1985-86 school year focuses on several major issues: the equipping and staffing of the computer labs; the nature and extent of lab use; staff development; school staff perceptions of the role of computers in education; and future needs and plans of the Phase I schools.

EVALUATION PROCEDURES

In order to pinpoint some of the specific areas to be investigated as part of this evaluation, Office of Educational Assessment (O.E.A.) staff conducted interviews with as administrator, a computer coordinator, and samples of teachers and students in seven Phase I schools (one from each

high school superintendency).* Based on this information, questionnaires were developed and mailed to principals of the remaining 86 Phase I schools in May, 1986. They were asked to distribute them to a school administrator familiar with the project, the computer coordinator, and five teachers of different subject areas and grade levels in their school using the MAC/VIP labs.**

SCOPE OF THIS REPORT

This report of the MAC/VIP Computer Program consists of three chapters. Chapter I includes an overview of the program, scope of the evaluation, and evaluation procedures. Chapter II presents the findings of survey responses, and Chapter III contains conclusions and recommendations.

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*These schools were selected in collaboration with the Office of Technology on the basis of the extent of their commitment to the project, and the likelihood, therefore, of their willingness to identify important issues related to its implementation; computer coordinators were asked to arrange for interviews with several teachers (of different subject areas) and students using the computer labs.

**Teachers were not randomly selected because not all subject area teachers were expected to be using the MAC/VIP computer labs during the project's first year of implementation.

II. FINDINGS

The findings presented here are based on the responses to questionnaires distributed by O.E.A. in May, 1986 to MAC/VIP participants in the Phase I schools, as described in Chapter I. A total of 67 computer coordinators (78 percent), 56 school administrators (65 percent), and 241 teachers (56 percent) returned questionnaires, which focused on various administrative and instructional issues related to the use of the computer labs during the 1985-86 school year.

EQUIPMENT AND STAFFING

Selection of Equipment and Organization of Labs

Information provided by the computer coordinators indicated that, for the 67 schools they represented, there was a total of 164 MAC labs, or an average of 2.4 per school. Seven schools had no MAC labs,* and the remainder were about evenly divided between having one, two, three, or four labs. There was a total of 77 VIP labs, less than half the number of MAC labs, averaging 1.1 per school: 20 schools had no VIP labs, 26 had one, 15 had two, and six schools had between three and five labs. Thus, there were over twice as many MAC labs in the schools as VIP labs, and many schools had several MAC labs, whereas few schools had more than one VIP lab.

Each school was given the choice of four brands of computers for its MAC and VIP labs: Apple IIe, Commodore 64, IBM PC, or Tandy 1000. For the

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* Some Phase I schools purchased only VIP labs during the first program year, delaying the installation of MAC labs until 1986-87.

67 schools represented by the computer coordinators, Table 1 shows the percentage of schools selecting each brand. (Table 2 presents the hardware selections for all Phase I schools.)

Since the Tandy 1000 is an IBM-compatible computer, it should be noted that 55 percent of the schools chose machines that run IBM software for their MAC labs, and 87 percent of the schools chose them for VIP labs. Thus, IBMs and compatibles dominated the schools' labs, with Apples constituting about 40 percent of MAC labs.

Explaining why they made these hardware selections, administrators said they chose Apples because of their reputation for being useful for educational purposes and the amount of educational software available; IBMs were chosen mostly because of their business applicability and quality reputation. Those administrators who chose Tandy 1000s listed IBM-compatibility, ease of maintenance, and dual disk drives as their chief reasons. (The IBM PCs bought for MAC/VIP labs were single disk drive machines.) In all cases, a majority of administrators (70 to 100 percent) reported being highly satisfied with their choices. Those who were not satisfied generally cited problems with IBMs such as frequent breakdowns, problems with repair service, and the slowness of single disk drives.

According to the computer coordinators, the labs were installed between May and October, 1985, with over half of the labs fully equipped by September, 1985 and close to 80 percent by October, 1985. Their use for instruction began during the same period, with approximately 60 percent of both the MAC and VIP labs being used by September, 1985 and 75 percent by October, 1985.

TABLE 1

Computer Hardware Selections made
by Phase I MAC/VIP Schools as
Reported by Responding Computer Coordinators[a]

	Brand of Computer			
Lab	Apple	Commodore	IBM	Tandy
MAC	42%	3%	14%	41%
VIP	11%	0%	52%	37%

[a]Percentages are based on 67 of the 93 Phase I schools.

- Most of the MAC labs were equipped with Apple and Tandy computers, whereas the VIP labs generally had IBMs or Tandys.

TABLE 2

Computer Hardware Selections made
by all Phase I MAC/VIP Schools[a]

	Brand of Computer			
Lab	Apple	Commodore	IBM	Tandy
MAC	47%	1%	35%	17%
VIP	5%	0%	40%	55%

[a]Based on information provided by the Office of Technology.

Management of Labs

Each school appointed a staff member, usually a teacher, to assume the role of computer coordinator. The duties of the computer coordinators covered a wide range of responsibilities. More than 85 percent of the responding computer coordinators reported being involved in each of the following tasks in connection with the labs:

-- scheduling lab use
-- training staff
-- troubleshooting hardware and software problems
-- making decisions about software selection and use

Most (84 percent) of the coordinators reported that they provided computer-related assistance to teachers in their school; nearly half (45 percent) worked with subject area supervisors and more than a third (36 percent) assisted school administrators. Assistance to teachers included help in evaluating and using software, computer operation, and using computer tool application -- i.e., word processors, databases, and spreadsheets. Training for supervisors and administrators focused largely on using the tool applications. Some coordinators (30 percent) also trained school secretaries and paraprofessionals in the use of word processors. The time spent on these staff development activities ranged from one to ten hours per week.

On the average, computer coordinators reported that 8.5 hours per week of their time was officially allocated to managing the MAC/VIP labs. (Ten percent said that no time was specifically allotted.) However, they reported that they actually devoted close to 15 hours a week to carrying out these responsibilities.

Software and Hardware Responsibilities

With regard to hardware maintenance, almost 80 percent of responding administrators said that someone in their schools could deal with basic equipment problems, and that about two-thirds of these people had received preventive maintenance and repair training. About half the time this role was filled by the computer coordinator, about one-third of the time by another teacher in the school, and about 10 percent of the time by an administrator.

Responsibility for software proved to be a time-consuming job, which involved reviewing and selecting software to be purchased, and trouble-shooting problems related to its use. In over 80 percent of the schools, administrators indicated that coordinators, department chairs, and other teachers all shared in these responsibilities; administrators also played a part in about half of the schools. Three-fourths of the responding administrators believed that there was insufficient time to review and select software.

USE OF THE LABS

Subjects and Applications

Computer coordinators were asked to identify those subject areas in which the MAC/VIP computer labs were being used for instruction in their schools. Cited by a large majority (between 80 and 90 percent) of the respondents were: programming; business; math; and English. About half mentioned science. Fewer respondents said social studies (40 percent), art and design (25 percent), and music (10 percent).

Of the 241 teacher respondents, close to 90 percent said that they used the computer labs for general instruction; other purposes included

enrichment and instructional problem-solving (by about 60 percent, respectively) and, to a lesser extent, remediation (by 34 percent). Among the computer applications used in the labs, those reported most by teachers were: word processing (58 percent); keyboarding (47 percent); computer programming (39 percent); and computer literacy (34 percent). Less than one-third of the respondents mentioned each of the following: drill and practice; tutorial or simulation software; databases; or spreadsheets. Some (15 percent) computer coordinators also indicated that their schools were using computers for telecommunications -- i.e., for communicating with remote computers or accessing information from them via telephone lines. The three networks being used, in descending order of frequency, were Dialog, Compunet, and CompuServe. In both vocational and academic areas, then, computers were being used primarily for computer applications such as word processing and programming, to a relatively small extent in the role of a tutor -- i.e., for computer-assisted instruction.

Nature and Extent of Use

Computer coordinators reported that the labs were used for an average of 27 hours per week for whole class instruction in their schools, although the amount of time varied widely -- from less than ten hours per week (nine percent) to full time (24 percent). Responding teachers reported that they taught an average of 8.5 class periods a week in one of the labs, or just over half of their average total teaching time.

About 40 percent of teachers said that they grouped students in some way for work in the labs. Their criteria included: the type of learning activity; the achievement level of students; and students' interests. With regard to achievement level, some teachers grouped students of the same

level together while others grouped students of different abilities together.

Three-fourths of the coordinators said that students also used the labs at other than regularly scheduled class times (e.g., for assignments, practice, independent study), and that this averaged about five hours per week in the MAC labs and two hours per week in the VIP labs. Schools made the labs available to students for these purposes at various times -- lunchtime, before or after school, and during free periods when the labs were not being used for class instruction. A major scheduling consideration was being able to provide adequate security. Most (87 percent) of the computer coordinators also reported that the teachers in their schools used the labs in their free time for activities such as lesson planning, reviewing software, preparing tests, and record keeping.

STAFF DEVELOPMENT

Computer Coordinators

When asked what training, if any, they received in computers and the use of computers in education, the computer coordinators mentioned the following sources: Technical Assistance Center courses (66 percent); central Board of Education conferences and workshops (61 percent); and college or university courses (58 percent). Nearly three-quarters (72 percent) of the coordinators said that this training adequately prepared them for their computer lab responsibilities. Those coordinators who said that they were inadequately prepared for their role (28 percent) cited the need for more training in computer repair, and help in locating and using software related to school curricula.

Teachers

Nearly two-thirds of the teacher respondents reported receiving in-school assistance in integrating the use of computers in subject area instruction. For the most part, the training was provided by the computer coordinators (reported by 65 percent of those receiving such help), although assistant principals and other teachers in the school also assisted teachers in such use of this technology (reported by 38 percent and 30 percent of teachers, respectively). Of those teachers who did not participate in on-site staff development (N=87), one-third stated that none was available, and close to half said they didn't need any assistance.

A majority (80 percent) of teachers pursued training outside their schools. Most (85 percent) considered themselves self-taught; other sources of training included colleges or universities (58 percent), Board of Education workshops and in-service courses (47 and 35 percent, respectively), and the Technical Assistance Centers (31 percent). Their most pressing need was for more training in how to use software for subject area instruction (mentioned by 39 percent of the 186 respondents who answered this question).

About three-quarters of the administrators responding to the questionnaire agreed that their greatest ongoing staff development need was training for teachers and administrators in evaluating and using software, especially in academic areas. Other concerns included training in the repair and servicing of harware, and techniques for managing the labs. Some (20 percent) also mentioned the need for administrators, clerks, and secretaries to be trained in job-related skills such as word processing and other tool applications.

Most (approximately 75 percent) of the adminstrators hoped that such support would be available from additional workshops and conferences sponsored by the Board of Education and the provision of funds to individual schools to enable them to extend the assistance afforded to their staff. Proposed ways of accomplishing this included hiring a full-time computer coordinator, arranging for team teaching in the labs, and giving teachers help on a one-to-one basis.

PROGRAM IMPACT

In addition to documenting the implementation of the MAC/VIP Computer Program, the O.E.A. evaluation sought to determine what impact, if any, this experience with the MAC/VIP labs had on the attitudes of teachers, administrators, and computer coordinators toward the use of computers in education. Survey questions focused on teachers' and students' roles, and perceived changes in student attendance and achievement.

Attitudes and Roles

Many administrators and teachers (37 and 52 percent, respectively) favored the use of computers for education prior to the introduction of the MAC/VIP Programs in their school. However, about a third of the teachers and a third of the administrators said that they had been either skeptical or fearful of computers initially, but now viewed this technology more positively. Some administrators (15 percent) and a few teachers (four percent) remained unconvinced that computers had wide-ranging educational applications.

For the most part, teachers perceived the use of computers as having a positive effect on various aspects of the learning process. They expressed

the opinion, for example, that students tended to be more motivated and self-directed (51 percent), freer to experiment and think critically (19 percent), generally more self-confident about their academic ability (14 percent), and more likely to interact with peers and teachers (11 percent).

Nearly two-thirds of the teachers commented on what they regarded as positive changes in their own role. They noted, for example, that they acted more as facilitators than lecturers in the computer labs (20 percent), resulting overall in greater individualization of instruction. Teachers used many terms to describe this change in role: facilitator, guide, resource person, consultant, tutor, coordinator, counselor, and advisor. Some of these terms refer to the individualizing effect of using computers, which lets teachers structure their time differently. Other terms highlight the nature of the teaching process itself in the labs, in a situation where much of the information and content of instruction comes from interaction with the computers. One teacher said, "Stay out of their way and let them learn!" But other teachers observed that while computers may provide some information that they previously presented, teachers are necessary in the computer lab environment for coordinating, supporting, and helping students to make sense of their experiences. In addition, about 20 percent of the teachers noted that these changes in their role made their job more interesting, more creative, or more motivating.

Not all respondents, however, found the demand of this new role challenging or the use of computers unquestionably beneficial. Some said that their job was more stressful because of the extra preparation time required (12 percent), that the teaching process was slower and more

confusing (five percent), or that the extra preparation time resulted in less teaching time (five percent).

Other teachers (about 10 percent), while generally optimistic about the value of computers, cautioned that there are students who are intimi dated by computers and that more patience and guidance is needed in helping them to overcome their fears and frustrations.

Attendance and Achievement

More than half of the administrators, coordinators, and teachers (53-63 percent) noted an increase in student attendance, which they attributed to the computer labs. Three-fifths of all respondent groups also perceived positive changes in students' performance, e.g., improved work habits, more creative and better quality writing, improved problem-solving ability, and increased math, programming, and word processing skills*; some (20 percent), however, believed that it was too early to assess the impact of the MAC/VIP computers on student achievement.

Since the use of computers in education is relatively new and neither the precise nature of the learning dynamics nor the likely outcomes fully understood, teachers were also asked what impact they anticipated continued computer-based instruction would have on student performance. In addition to outcomes associated with more traditional instructional approaches -- such as improved test scores -- close to one-third of the teachers referred to desirable outcomes such as the ability to take the initiative and to work independently, a greater willingess to take risks (e.g., attempting to

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*It should be noted that these reported outcomes are respondents' perceptions, not direct measures, of changes in attendance, attitudes, or achievement.

solve more difficult or challenging problems), improved job-related attitudes, and collaborating with and helping their peers.

Future Needs and Plans

When asked what advice they would give to other schools introducing the MAC/VIP program, administrators emphasized the need for advance planning, previewing software, ongoing staff development and encouragement of optimal use of the labs (by students and faculty), and service contracts for equipment repair.

In discussing changes they hoped to make next year, computer coordinators stressed the following: the use of networks and modems; upgrading printers, internal memory capability, and peripherals; getting dual disk drives and better monitors; assigning full-time coordinators, assistants and paraprofessionals to the labs; and providing more training for all school staff. They also urged that the labs be used for teaching science and social studies, subject areas in which they were used minimally during the 1985-86 school year.

Questioned about what assistance they would like from the Office of Technology next year, administrators and coordinators cited staff development, especially in integrating the use of computers in subject area instruction, help in reviewing software and securing hardware repairs; better communication between the schools and the Technical Assistance Centers, particularly regarding curriculum development; and help in the site licensing of software so that multiple copies can be made.

III. CONCLUSIONS AND RECOMMENDATIONS

The findings of this evaluation indicate that in its first year of operation the MAC/VIP program was largely successful in assisting New York City high schools to promote the use of computers in education.

Most of the computer labs were installed and being used for instruction by October, 1985. Given the enormity of the task of processing hardware orders, electrifying and securing rooms, and installing equipment in close to 100 high schools, this was a notable achievement. Overall, administrators were satisfied with their hardware choices, although there were problems in securing equipment repairs and functional limitations, e.g., with respect to operation speed, memory, and printing capabilities.

Management of the labs was typically assumed by a teacher who served as a computer coordinator. The responsibilities were wide-ranging and included scheduling lab use, training school staff, reviewing and selecting software, and troubleshooting hardware and software problems. They reported spending about twice as much time in fulfilling these duties (about 15 hours per week) as was officially allocated. While computer coordinators generally felt adequately prepared for this role, they expressed the need for aides to assist them in the labs and more time to review and select software.

In this first year of program operation, the labs were used primarily for teaching computer applications, such as word processing and programming, and relatively little for instruction in the subject areas. This was due largely to problems in identifying and purchasing quality software appropriate to specific curriculum objectives, and teachers' lack of confidence in integrating computers with their regular classroom

instruction. Nevertheless, teachers reported that they taught slightly more than half their teaching time in one of the computer labs during the 1985-86 school year, and both students and teachers also made use of them outside of regularly scheduled class times. Although a majority of teachers reported receiving some in-school assistance (primarily from computer coordinators) and participating in various computer-related staff development activities, continued support is needed if there is to be widespread use in the teaching of academic subjects.

Large proportions of administrators, computer coordinators, and teachers in the Phase I MAC/VIP schools expressed enthusiasm about the value of computers in education, including some who had previously been skeptical. Many attributed positive changes in students' attendance and attitudes toward their schoolwork to their computer-based experiences in the labs. Teachers also cited what they considered to be important changes in their own role in the educational process, most notably their tendency to act more as facilitators of learning than lecturers, a shift which they believed promoted greater individualization of instruction.

These findings are very encouraging in that greater self-directedness and self-confidence in students' approach to learning and greater individualization of instruction may prove to have a positive effect on student achievement. In fact, some teachers and computer coordinators cited such gains. However, its should be noted that these reported outcomes are participants' <u>perceptions</u> and not direct measurements of changes in student or teacher behavior. Thus, caution must be exercised in drawing conclusions about the effects of computers on attitudes toward learning and teaching, and of course, on student achievement.

Based on the evaluation findings, the following recommendations are made:

- Continued assistance should be provided to school staff in evaluating educational software, and obtaining site licensing or multiple copy agreements.

- Efforts to develop computer-related instructional materials (software and teacher guides) specifically correlated with current curriculum mandates should be continued.

- Ongoing and expanded assistance and encouragement should be provided to all school personnel, and particularly to supervisors and teachers in integrating computer use in subject area instruction; to the extent possible, such training opportunities should be available on-site and be responsive to individual school needs.

- New funding should be made available to schools to: 1) upgrade computer equipment and secure better and more cost-effective means of dealing with maintenance and repairs; and 2) provide additional resources for both managing the computer labs and making them more accessible to students and staff.